

Application No. 10/823,311
Docket No. UC0423USNA

Remarks

Status of the Application

Status of Pending Claims

Claims 1-19 are pending, although claims 13-15 and 19 have been withdrawn per election in response to a restriction requirement.

Claims 1-12 and 16-18 stand rejected under 35 U.S.C. §§ 102(b) and 102(e). Claims 16-18 stand rejected under 35 U.S.C. § 103(a).

The rejections are addressed in order below.

Claims 1, 3, 4, 5, 17 and 18 are amended, and claims 20 and 21 are added.

Claim 1 is amended to specify that the two layers are distinct, i.e., that their composition is different. Please see the disclosure at page 2, lines 29-30 ("composite" refers to a structure made up of two or more layers) and Examples 3 and 7, showing distinct compositions of the two layers and demonstrating that there is no chemical interaction between the two layers, making them chemically and structurally distinct.

Claims 3 - 5 are amended to correct a spelling error, changing the incorrect "alkythio" to the correct spelling "alkylthio".

Claim 17 is amended to clarify its form, by deleting "of Claim 1" and thereby to refer to said composite recited in Claim 16. Accordingly, this amendment clarifies that Claim 17 was not intended to be, and is not currently written as, a multiple dependent claim. The claim is otherwise in proper form because it further clarifies Claim 16 by specifying that the composite is a buffer layer.

Claim 18 is amended to insert the word "from" in the appropriate place.

Claims 20 and 21 add further limitations, within the scope of the original claims, which specify (Claim 20) that at least a portion of the first layer is in physical contact with at least a portion of the second layer, and (Claim 21) that at least one additional layer is interposed between the first layer and the second layer. Please see the disclosure at page 15, lines 1-5.

Accordingly, Applicants respectfully submit that no new matter has been introduced and that the amended and new claims are within the scope of original and previously presented claims heretofore examined on the merits.

Claims 1 and 16 are independent, and all other claims depend either directly or indirectly from these claims.

Claims 1-12 Not Anticipated by Hsu Article in *Synthetic Metals*

The composite in the Hsu article is comprised of Nafion[®] film and a conductive polymer where the conductive polymer diffused into the film, and the polyaniline conductive polymer was actually formed by polymerization in the film itself. Please see the Hsu article at page 672, full paragraph. By contrast, the claims, as exemplified by amended Claim 1, are directed to a bi-

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layer composite comprising a doped conductive polymer (first layer) and an acid or salt of an acid (second layer), where the composition of the two layers is different. The specification, page 15, lines 1-5, recites that the two layers of the bilayer composite are, in one embodiment, adjacent to each other so that at least a portion of the first layer is in physical contact with at least a portion of the second layer; in another embodiment, one or more additional layers are interposed between the first layer and the second layer. The Hsu article does not disclose a bi-layer composite as required in the claims. Claim 1 recites two distinct layers and, as pointed out, the composite material of the Hsu article has diffusion of the polymer within the film, so that the two layers are not distinct, and there is no bi-layer structure or composition as in the claims. Accordingly, this rejection is overcome.

Claims 1-12 and 16-18 Not Anticipated by Ohtani, U.S. Patent No. 4,869,979

Ohtani discloses a conducting organic polymer battery in which the cathode comprises a conducting polymer doped with a polymer anion, a metal anode, and a solid electrolyte as an ion conductive phase (this phase conducts M^+ ions from the metal anode to the p-type conducting cathode and, when a reverse voltage is applied, conducts M^+ ions to the metal anode to regenerate the battery). The electrolyte in Ohtani may be either a solution or a solid. Ohtani does not anticipate the present claims because Ohtani does not disclose a bi-layer composite and in fact requires a third component, the metal anode, which must also be in contact with the electrolyte, not present in the claims under review. Since the conductive polymer in Ohtani constitutes the cathode, there is no disclosure of a bi-layer composite such as required in the instant claims, as amended, where the first and second layers of the composite may be in partial physical contact, or separated by one or more intervening layers.

Claims 1-12 and 16-18 Not Anticipated by Kokonaski, US 2004/0217877

Kokonaski, like Ohtani, teaches separate layers of conductive polymers, both of which must be in direct contact with an electrolyte. In Kokonaski, the solid electrolyte is the ion source. Kokonaski discloses two related embodiments. The first is an electrochromic cell in which a solid electrolyte 440 is placed over two electrodes. The solid or semi-solid electrolyte may be made from polystyrene sulfonate or Nafion[®] in addition to other materials. The electrode 420 and 430 materials may include conjugated polymer films. The disclosure pertaining to electrochromic cells (see paragraph [0025] and Figs. 4 and 4A) does not teach that the conductive polymers are doped, as in the claims, nor does it teach a bi-layer composite as recited in the claims under review. In the present claims, the conductive polymer is doped (first layer) and the second layer comprises a colloid-forming polymeric acid/salt or a non-polymeric fluorinated organic acid/salt. The first Kokonaski embodiment teaches two electrodes (either of which may comprise a conductive polymer) in contact with an electrolyte that can comprise a polystyrenesulfonate or Nafion[®]. An example of a first layer of the claims would be

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PEDOT:PSS or poly(3,4-ethylenedioxythiophene) poly(styrenesulfonate), which is a polymeric mixture of two ionomers. An example of a second layer would be Nafion[®], and these two layers form the claimed bi-layer composite. In Kokonaski, the Nafion[®] electrolyte is in contact with both electrodes, which comprise undoped conductive polymers.

Kokonaski's second embodiment is an electrochemical transistor that may be used in a device in conjunction with the electrochromic cells of the first embodiment. A layer of solid electrolyte 550 is placed over conductive polymer electrodes. The conductive polymers are not explicitly doped, as in the claims, but (paragraph [0026]) states that, "[the recited conductive polymers] possess variable electrical properties depending upon the doping state of the polymer which can be controlled by applying varying potentials across the two gate contacts."

Kokonaski does not set forth each and every element of the claims, in the order in which the claim elements are presented, and therefore cannot anticipate the claims under review.

Claims 1-12 and 16-18 Not Anticipated by Hsu, US 2004/0102577

Hsu discloses aqueous dispersions of a conductive polymer (polythiophenes) and colloid-forming polymeric acids, where the term "dispersion" is understood to mean a continuous liquid medium containing a suspension of minute particles (paragraph [0025]). In Hsu, the colloid-forming acid can be copolymeric. The claimed composite is a bi-layer where the first layer comprises a doped conductive polymer and the second layer comprises a colloid-forming acid/salt or a non-polymeric fluorinated organic acid/salt. The bi-layers are distinct, having different chemical composition and comprising two physical structures which may be in full or partial contact, or separated by intervening layers, and therefore not adjacent to each other. In Hsu, there is no composite bi-layer. While the buffer layers of Hsu may be applied in multiple thin layers (paragraph [0066]) this does not disclose the bi-layer composite of the claims because the thin buffer layers are the same material, and not distinct layers. Example 10, paragraph [0134], clearly shows that while these layers differ in thickness (though only slightly), they comprise the same materials and are therefore not distinct layers as are the two layers of the claimed composite bi-layer. The buffer layer may also be overcoated with a conductive polymer ([0090]) but these are similar to the buffer layer and are not identical or equivalent to the second layer in the claims. These observations apply equally to claims 39-42 cited by the Examiner. Applicants respectfully submit that this rejection has been overcome.

Claims 16-18 Non-Obvious Over Hsu Article in *Synthetic Metals*

Prima facie obviousness has not been established because, as noted above, the composite in the Hsu article and that of the claims are patentably distinct. The recited ground of rejection is that it would have been obvious to one of ordinary skill in the art to use the reference composite in an electrical device. The rejection fails to address the fact that the composite in the claims is, for reasons stated above, patentably distinct from the reference composite material.

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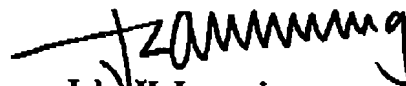
Accordingly, no *prima facie* finding of obviousness has been established, because the reference has not been modified by simply incorporating the reference material into an electrical device, as appears to have been assumed in the Office Action. For these reasons the rejection should be withdrawn.

Conclusion

On the basis of the foregoing amendments and remarks, Applicants respectfully submit that claims 1-12, 16-18 and 20-21 are in condition for allowance. A notice of allowance for those claims is earnestly solicited.

If the Examiner has questions about the status of the claims or the contents of this paper, the Examiner is invited to call the undersigned at the telephone number listed below.

Respectfully submitted,



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Dated: August 27, 2007